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He is to assume the duties of the position in April, 1899.

ON the recommendation of the General Board of Studies of Cambridge University a University lectureship in chemical physiology was established without a stipend for the present.

DISCUSSION AND CORRESPONDENCE.

ON THE EARLY SENSE OF SELF.

TO THE EDITOR OF SCIENCE: Professor G. Stanley Hall, in the last *American Journal of Psychology*, asks (p. 354) some questions on the early sense of self, which we may briefly answer on the basis of evolutionary psychology.

1. "In the first contact of hand and mouth does the latter feel the former first and most, or *vice versa*?" We answer that the mouth feels the hand first and most, because the mouth is the earlier integrated tactual organ in the history of life. The hand as locomotive organ modified for grasping, only gradually becomes tactile in the race and individual. The hand is merely one object of the many which the child brings to the mouth for interpretation, and so it mouths the hand rather than handles the mouth. The child comes by the peculiar plexus of sensations involved to understand its hand as a different kind of object from its rattle, namely, as a self-object, a part of the somatic self.

2. "Does the eye first find the hand because the eye moves, or because the head moves, and does a motor or a sensory process lead?" As head-moving as method of vision direction is earlier integrated than eye-moving, we should expect the infant to employ head-moving first, and most largely for some time; and for the same reason motor process would lead. We should expect (as p. 351 instances) that the child would first have its attention called to its hands, not through sensations therefrom like temperature or muscular, but by a general movement of hands happening to occur in the field of vision. More thorough studies of infants with reference to head-moving and eye-moving ought to be made, and especially to learn at what age its attention may be directed to its fingers by, *e.g.*, merely pinching them.

3. "What social and ethical factors are involved in the child's scolding and punishing

naughty hands?" The social factor, imitation, is evident, and the ethical factor of the responsibility of the hand for its own acts before it is fully incorporated into the somatic self is also evident. The child who says, when reproached and punished for pushing over a vase, 'I did not do it, hand did it,' is not necessarily falsifying, but often telling the exact truth about the instinctive independency of the hand in its impulse to grasp and push. The child has no memory of acting through his hand, and practically did not, and hence properly blames and punishes the hand. Far more than the adult realizes, the hand with the very young acts in grasping, touching, etc., instinctively and independently, and only very gradually comes in action to be a part of the real self. The parent who exclaims to the child: 'naughty hand!' and punishes the hand, only helps to keep apart in the child's mind the hand-self and the real self; whereas the child should be helped to incorporate its organs into its real self as fast as possible. Pedagogically this is a matter of considerable importance.

4. "Have we, so far, instinct, feeling, will, reason, attention, or mere automatism?" The earliest sense of self in child life is, no doubt, instinctive, in that it comes spontaneously at the impulse of a vast heredity. A reference of all things to the self, a constant interpretation of environment as to its action on the self, is implied in the whole struggle of existence, and strengthens till it becomes thoroughly integrated, that is, becomes instinct. It is plain that the self-unconscious, self-forgetful animal would not have the least chance of survival; but a continual alertness for self is the prime requisite, though the self at the first is undoubtedly very indefinite. The child in its earliest, most subjective experiences, wherein is the merest glimmer of object, namely, in the primitive flashes of pain and pleasure, awakes to itself, and its general struggling repeats earliest life. In these subjective experiences the child builds an *ego* long before it constructs a definite somatic self of hands, feet, etc., which, indeed, are not felt as me, but mine. That is, the somatic self is not the primary and real self, but the child learns the several members as standing in a peculiar relation to its own ex-

periences, and makes the members modes of itself. But while the child *learns* its members most animals appear to be instinctively aware of their somatic self in its parts and so to use them from the hour of birth. But only through the piecemeal learning of the somatic self does there come a full and strong sense of self. The man's hand is more really and fully his than is the crab's claw its claw. Self-conscious self-consciousness and all the high egoism comes of learning. However, the child learns itself in hand, foot, etc., by instinctive impulse, just as it learns to walk instinctively; but the learning, of course, implies attention, will, reason and feeling.

HIRAM M. STANLEY.

LAKE FOREST, ILL., June 16, 1898.

COLOR VISION.

IN regard to the points concerning which Professor Titchener considers that I have not correctly represented what he had to say on color theories in his letter in *SCIENCE* of June 17th it is so easy for the reader of *SCIENCE* to form his own opinion, if he is sufficiently interested in the subject to compare that letter with my reply to it, that there is no occasion, fortunately, to prolong the discussion. Since Professor Titchener has given so much attention to optics during the past year as he says he has done, he must plainly be much more familiar with the subject than most of the psychologists have time to be, and I have certainly hit it off very badly in accusing him of ignorance.

C. LADD FRANKLIN.

SCIENTIFIC LITERATURE.

Organographie der Pflanzen, in besondere der Archegoniaten und Samenpflanzen, I. Teil.
K. GOEBEL. Jena, G. Fischer. 1898.

This first part of Dr. Goebel's *Plant Organography* has been awaited with impatience by many botanists who knew that such a work was in process of construction. Now, that the first half of the treatise is off the press, it can already be understood what an important and timely contribution to botanical literature is this latest work by certainly the foremost German plant morphologist, if not absolutely the foremost in the world. In reading through the

attractive pages one is impressed, first of all, by the charming lucidity of the literary style, then by the freshness of the illustrative material, then by the perfect mastery of a wealth of detail and accessory or incidental matter, and finally by the philosophical and unpolemical tone of the whole. Professor Goebel has succeeded in bringing together from his own voluminous researches, and from the byways as well as the highways of botanical literature, a most interesting and suggestive volume. His general point of view is not at all new, for the foundation of organ-evolution is sought in adaptation rather than in the spirit of the recent *Entwickelungsmechanik*. Strong antagonism is manifested to the archaic 'ideal-philosophy' or 'nature philosophy' of Goethe and Herder, which one would think, from the somewhat unnecessary space given to its annihilation, must exist somewhere in the vicinity of Munich. The Goethean concept of the leaf, the stem, the flower, as in some mysterious sense types, or ideal plans, is generally so extinct that there seems scarcely justification for seriously girding at it. Goebel points out, truly enough, that there is no such thing as a leaf rudiment, but only bud-scale rudiments, sporophyll rudiments, cataphyll rudiments, foliage-leaf rudiments, etc. The leaf and the leaf rudiment are pure abstractions. But this does not seem to the reviewer so strong a position upon which to found a theory of metamorphosis as at first it did. It is true, Goebel's doctrine of pure metamorphosis is based upon just this conception of rudiments, and hence the position is important if one wishes to understand his work.

It would seem that one has quite as much right to insist that there are no bud-scale rudiments, but only willow bud-scale rudiments, poplar bud-scale rudiments, walnut bud-scale rudiments, cherry bud-scale rudiments, etc. Thus the bud-scale rudiment becomes, by the same process of reasoning, quite as vague an abstraction as does the leaf rudiment. As a practical proposition, Dr. Goebel's willingness to substitute analogy for homology in the foundations of botanical terminology cannot have much weight, for everywhere it is the phylogenetic test that is regarded as final, and analogies are rightly regarded as of secondary importance in